NEW CALIFORNIA GRASSHOPPERS OF THE GENERA *MELANOPLUS* AND *HYPSALONIA* (ORTHOPTERA, ACRIDIDAE)

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The three species of flightless grasshoppers here described include two species of *Melanoplus* from the northwestern part of California and one species of *Hypsalonia* from El Dorado County. Discovery of the latter is somewhat surprising because it occurs in an area very close to previously known species. The genus *Hypsalonia* has recently been revised (Gurney & Eades, 1961).

The two species of *Melanoplus* comprise a new species group, discussed following the descriptions. The new group is related to the *occidentalis* group, and it not only adds to previous evidence of the rich and imperfectly known orthopteran fauna of California, but provides a further indication of the natural grouping of the numerous species of this genus. An outline of those species groups of *Melanoplus* that contain brachypterous Far Western species was given recently (Gurney, 1961, pp. 163–165), and it is anticipated that active collecting will continue to add considerably to the number of species, as well as require minor modifications of groups now recognized and the recognition of several new groups.

Paratypes will be distributed to the principal North American collections insofar as possible.

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Melanoplus keiferi, n. sp.

Figs. 1, 4–6

Holotype.—Male. Northwest corner of Glenn Co., Calif., 4.5 miles south of Mendocino Pass, 6,500 feet, 29 July 1960, in copula (H. B. Leech). [U. S. National Museum, Type No. 66, 498].

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Size medium for group; tegmina reduced in length, lanceolate. Head in dorsal view with interocular distance in proportion to width of compound eye as 4:11; fastigium strongly declivent anteriorly and shallowly sulcate; frontal costa not sulcate except slightly near median ocellus. Pronotum with lateral carinae indistinct, especially on anterior part of prozona; median carina of prozona weak, absent on posterior half, cut by two sulci; median carina of metazona distinct; entire surface of pronotum dull, with sparse but prominent short hairs, best seen in lateral view; principle sulcus feebly curved anteriorly where it cuts median carina; median carina of prozona barely longer than metazona; posterior margin of metazonal disk broadly produced, of about 120 degrees angulation; prosternal spine bluntly conical. Tegmina extending above about one-half the abdomen, overlapping for their entire length. Apical portion of abdomen moderately enlarged and weakly curved dorsally. Legs robust.

Supra-anal plate (Fig. 1) equilaterally triangulate, lateral margins somewhat elevated in basal third; 2 longitudinal submedian ridges strongly developed and at posterior ends curved 90 degrees laterally to form a transverse ridge, centrally broken. Furcula scarcely present. Cercus (Fig. 4) broadly attached, expanding slightly for one-half of length, then expanding mesally conspicuously, becoming one-third larger distally and reminiscent of the *occidentalis* group, lateroposterior extremity more angulate than in *chimariki,* surface near apex broadly and shallowly concave.

Concealed genitalia (extracted and preserved dry, attached to specimen; description largely from paratypic preparation in glycerine) with main fleshy portion of aedeagus erect (Fig. 5); a specialized, parchmentlike piece arising dorsally at each side, darkly pigmented on most of a lateroposterior lobe, anterior portion of this piece unpigmented and divided into a long lateral and a short mesal lobe; dorsal valves long, slender, tapering, gently curving posteriorly near tips, indistinctly pigmented along margins; ventral valves shorter than dorsal valves, narrow, straplike, only moderately pigmented; epiphallus with ancorae large and down-curved, lophi prominent and in lateral view with dorsal margins broadly rounded.

Coloration.—Dorsal surface of head, thorax, tegmina, front and middle legs light grayish-brown, abdomen and ventral surface of body pale clay yellow; hind femur pale, with 3 black transverse bars on lateral and dorsal surfaces, the one at extreme base indistinct, genicular area also dark, pink ventrally and on basal two-

thirds of mesal surface, genicular area and transverse bar on apical third black on mesal surface; hind tibia grayish-blue, some black at base, spines black, spurs black-tipped; tarsi pale.

Measurements (in millimeters).—Length of body, 17.0; pronotum, 4.5; hind femur, 9.7; front femur, 3.5; tegmen, 5.9. Greatest width of pronotum (posterior, including lateral lobes in perspective from above), 4.0; hind femur, 3.1; front femur, 1.1; tegmen, 2.4.

Allotype.—Female, same data as holotype and collected mating with it. [U. S. National Museum].

Head in dorsal view with interocular distance in proportion to width of a compound eye as 7 : 12; eye less globose than in male; fastigium feebly sulcate, median carina of prozona slightly longer than metazona on median carina (as 21 : 20); posterior margin of pronotum with about 130 degrees angulation; tegmina reaching to middle of tergum 4, over a little less than half the length of abdomen. Cercus with dorsal margin nearly straight, ventral margin strongly convex, apex blunt, rounded; dorsal ovipositor valve with "scoop" deeply and broadly concave, basal portion with quadrate irregularities along lateral margins, transverse basal ridges also present.

Coloration.—Essentially as in holotype, but a little darker with colors less contrasting.

Measurements (*in millimeters*).—Length of body, 21.5; pronotum, 5.2; hind femur, 11.0; front femur, 3.2; tegmen, 7.0. Width of pronotum, 5.0; hind femur, 3.5; front femur, 0.8; tegmen 3.1.

Variation.—The holotype and allotype are slightly larger than the paratypes. Ten male and 10 female paratypes have been measured (in millimeters), with results as follows: Length of body of males 14.0–17.0 (av. 15.83), of females 19.0–22.0 (av. 20.90); of pronotum of males 3.7–4.2 (av. 4.00), of females 4.6–5.3 (av. 4.96); hind femur of males 8.7–9.5 (av. 9.00), of females 10.1–11.4 (av. 10.73). Most males which have not had the abdomen relaxed for genitalic study have marked dorsal curvature of the abdomen; average body length for 6 such males is 14.9 mm. Tegmen length is nearly uniform, and in most paratypes of both sexes the tegmina extend above a little less than half of the abdomen. Little variation in the shape of the male cercus occurs, and all the paratypes differ from the unique type of *chimariki* on the basis of the male cercus. In about half of the males there are no distinct transverse ridges at the apices of the submedian longitudinal ridges of the supra-anal plate.

The aedeagus of 12 paratypes (6 dry, 6 in glycerine) has been examined, and in most of them the small mesal lobe of the special-

ized lateral piece is indefinite and inconspicuous. The tall anterior lobe is always well developed and conspicuous. The pigmented area of the lateroposterior lobe is striking in all except one specimen; it sometimes rises decidedly above the level of the fleshy lobes of the main body of the aedeagus, and it usually is a diagnostic character of *keiferi.*

Except that some paratypes are somewhat darker, with light and dark colors less contrasting, there is no significant color variation among the paratypes.

Specimens examined.—56 (26♂, 28♀, 2 juv. Holotype, allotype, paratypes). California: Mendocino Pass, 26 July 1961 (J. R. Helfer), 5 ♂, 3 ♀, 2 juv.; northwest corner of Glenn Co., 4.5 miles south of Mendocino Pass, 6,500 feet, 29 July 1960, in copula (H. B. Leech) (holotype, allotype); Plaskett Meadows, 14 Sept. 1960 (G. M. Buxton), 11 ♂, 8 ♀, includes 2 mating pairs; 4 miles west of Plaskett Meadows Station, 27 Aug. 1961 (D. C. Rentz), 5 ♂, 5 ♀; 2 miles west of Plaskett Meadows Station, 27 Aug. 1961 (D. C. Rentz), 4 ♂, 11 ♀.

The place referred to on labels as "Plaskett Meadows Station" appears on some maps as the Plaskett Ranger Station. The type series originated at various places along a stretch of about 8 miles of the Alder Springs Road, extending northwest from the ranger station to Mendocino Pass. Plaskett Meadows, per se, is the name given to open, upland meadowlike areas bordering the Alder Springs Road, mainly some 4 miles northwest of the ranger station.

It is a pleasure to name this grasshopper in honor of our friend Hartford H. Keifer, who for many years has been a leading California naturalist. The vicinity of Plaskett Meadows in Glenn County is one of his favorite collecting sites.

Melanoplus chimariki, n. sp.
Figs. 2, 7–9

The only known relative of *chimariki* is *keiferi,* described above. The male cercus apparently permits separation of the two species, but the aedeagus is clearly diagnostic for each and should be consulted for precise identification. The most distinctive structure is the specialized lateral piece which arises from the aedeagus.

Holotype.—Male. South Fork Mountain, 4 miles southwest of Hyampom, Trinity Co., Calif., 14 Sept. 1960, Calif. Dept. Agric. no. 62J23-3 (T. Gallion) [U. S. National Museum, Type no. 66, 499].

Size medium for group; tegmina lanceolate, the widest area in the proximal one-third. Head in dorsal view with interocular distance in proportion to width of compound eye as 3:7; fastigium strongly declivent anteriorly and moderately sulcate; frontal costa shallowly sulcate. Pronotum with lateral carinae very broadly rounded on metazona, absent from anterior part of prozona; median carina low but distinct on metazona, absent on prozona; principal sulcus slightly curved anteriorly where it cuts the mid-line; mid-line of prozona cut by a sulcus very near anterior margin, a second one about mid-length, and a third one-fourth the length from posterior margin; prozona and metazona of subequal length on mid-line; posterior margin of metazonal disk rounded, with 120 degrees angulation; prosternal spine bluntly conical. Tegmina extending slightly beyond base of abdominal tergum 5, over about half of abdomen, overlapping for entire length; wings a little shorter than tegmina, incapable of flight.

Apical portion of abdomen weakly enlarged and moderately curved dorsally. Supra-anal plate (Fig. 2) equilaterally triangulate; lateral margins somewhat elevated in basal two-thirds; longitudinal submedian ridges moderately developed; no transverse ridges. Furcula scarcely present; cercus (Fig. 7) broadly attached as in *keiferi,* expanding lateroposteriorly in a gentle curve, not abruptly as in *keiferi,* the mesoposterior portion broadly produced, the surface of apical half conspicuously concave.

Concealed genitalia (preserved in glycerine) with fleshy portion of aedeagus erect and turretlike (Fig. 8); a specialized piece arising dorsally from mesal margin of each outer side; transparent and membranous except for narrow pigmented vertical stripe lateroposteriorly; dorsal valves slender, tapering, erect and gently curving posteriorly near apex, moderately pigmented; ventral valves short, narrow, not curved posteriorly, scarcely pigmented; epiphallus as in *keiferi.*

Coloration.—Ground color grayish-brown, region of mouth, ventral surface of thorax, and most of abdomen pale brown; compound eyes reddish-brown; hind leg about as in *keiferi,* ground color of femur a little paler, and transverse bars less distinct.

Measurements (in millimeters).—Length of body, 20.0; pronotum, 4.6; hind femur, 10.7; front femur, 3.7; tegmen, 7.2. Greatest width of pronotum, 4.3; hind femur, 3.2; front femur, 1.2; tegmen, 2.8.

Specimens examined.—1 ♂ (holotype).

The type locality of *chimariki,* on the Blake Mountain Lookout

service road, is on the crest of the South Fork Mountain ridge where it crosses the line between Trinity and Humboldt Counties at an estimated elevation of 5,700 feet. This is 4 miles southwest of the village of Hyampom and about 55 air miles north and west of Plaskett Meadows where *keiferi* was discovered.

The specific name is adapted from the name of the Chimariko Indians, a very small tribe which occupied a restricted area of the Trinity River valley just north of Hyampom.

Characters of the keiferi group

For the two species just described we recognize a new species group, known as the *keiferi* group. Particularly in the shape of the male cerci, closest relationship to the *occidentalis* group is suggested. The cerci also suggest relationship to the *rileyanus* group, but an analysis of several characters shows that relationship to the *rileyanus* group is apparently quite distant.

Male cerci of the *keiferi* and *occidentalis* groups are somewhat similar to each other except that those of the former have a longer base, thus acquiring a more boot-shaped appearance. On the other hand, the cerci of the *rileyanus* group curve mesally more strongly and the apical margin is more irregular. The furcula is absent to very short in the *keiferi* group, very short in the *occidentalis* group but approaches one-half the length of the supra-anal plate in the *rileyanus* group. Tegmina are reduced in length and lanceolate in the *keiferi* group, fully developed in all of the *occidentalis* group except *occidentalis brevipennis* Bruner, which has reduced lanceolate tegmina, and quite short and lobate in the *rileyanus* group.

In the *keiferi* group the dorsal and ventral valves of the aedeagus are elongate and narowly straplike, and each dorsal valve is distinct at base from the corresponding specialized lateral piece which arises from the aedeagus. In the *occidentalis* group the dorsal and ventral valves are shorter, scarcely or not at all straplike, and at the base the dorsal valve is closely joined to the specialized lateral piece. The dorsal and ventral valves of the *rileyanus* group are quite different from those of the *keiferi* group.

In distribution the *keiferi* group is restricted to northwestern California; the *occidentalis* group extends from the Great Plains westward across the Great Basin, but it occurs in California only in the extreme northeast and near the base of the eastern Sierras (Panamint Range); the *rileyanus* group is known only from Yuba and Placer Counties south to Inyo, Kern, and Los Angeles Counties, California. The most fundamental reason for placing *keiferi*

and *chimariki* in a group distinct from the *occidentalis* group (*occidentalis occidentalis* (Thomas), *occidentalis brevipennis* Bruner, *cuneatus* Scudder, *rugglesi* Gurney, is the dissimilarity in the parts of the aedeagus. Each of the three groups here discussed is a very cohesive assemblage of species so far as the aedeagus is concerned.

Hypsalonia merga, n. sp.
Figs. 3, 10–12

In size, coloration and distribution, *Hypsalonia merga* is very similar to *H. rentzi* Gurney & Eades. The aedeagus, however, is very distinct, especially in the ventral valve, which is forked in *merga* and knobbed in *rentzi.* For most male specimens, the prominences of the supra-anal plate are more evenly shelflike in *merga* than in *rentzi,* but this feature does not separate all males, and dependence must be placed on the aedeagus.

Holotype.—Male. Top Lake, El Dorado Co., Calif., ex-*Carex* sp., 22 Aug. 1962, Calif. Dept. Agric. no. 62J23-1 (Buxton & Blanc) [California Department of Agriculture, Sacramento, Calif.]

General appearance fusiform; without conspicuous vestiture. Head with dorsal interocular distance about twice the width of an eye; frontal costa a little narrowed at junction with fastigium, strongly sulcate; carinae bordering fastigium at narrowest interocular area prominent; width across eyes in frontal view compared with width across genae as 30 : 34; dorsal level of eyes in frontal view slightly below highest level of vertex.

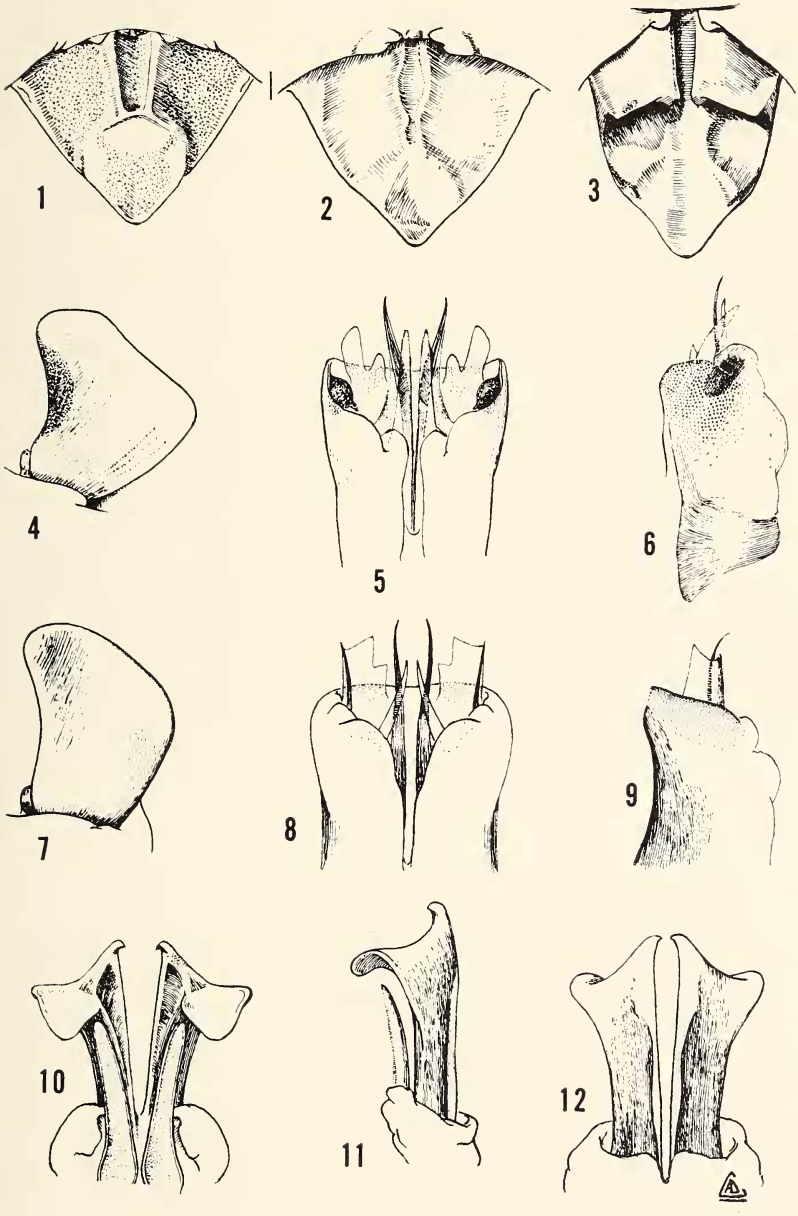
Lateral lobe of pronotum with ventral margin straight in poster-

Explanation of Plate

Melanoplus keiferi, n. sp. Fig. 1, Supra-anal plate, holotype. Fig. 4, Cercus, male paratype from Mendocino Pass. Fig. 5, Posterior view of aedeagus (in glycerine), paratype from Plaskett Meadows. Fig. 6, Lateral view of aedeagus, same paratype as in Fig. 5.

Melanoplus chimariki, n. sp. (all drawn from holotype). Fig. 2, Supra-anal plate. Fig. 7, Cercus. Fig. 8, Posterior view of aedeagus. Fig. 9, Lateral view of aedeagus.

Hypsalonia merga, n. sp. Fig. 3, Supra-anal plate, holotype. Fig. 10, Dorsoanterior view of aedeagus (dry), paratype. Fig. 11, Lateral view of aedeagus. Fig. 12, Posterior view of aedeagus. Figs. 11–12 from same paratype as Fig. 10.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ior portion, curved with slight concavity anteriorly; ventroposterior angle approximately 90 degrees; prosternal process extremely weak; minimum width of mesosternal interspace subequal to opposite width of a lateral lobe; distance between metasternal pits a little less than opposite width of a lateral lobe, as 11 : 14; front and middle femora each longer than pronotum.

Cercus roughly quadrate, the apical margin directed obliquely to the ventral margin from a moderately acute point at the extreme apex, near the end of the dorsal margin; furcula consisting of minute rounded lobes; prominences of supra-anal plate (Fig. 3) shelflike, the lateroposterior corners distinctly elevated but in line with posterior margin of "shelves"; paraproct with subapical carina.

Concealed genitalia (preserved in glycerine) with dorsal aedeagal valves erect, slender, blunt-tipped, shorter than ventral aedeagal valves; each ventral valve distinctively forked so that a broad shelflike portion extends anteriorly (Figs. 10–12). Epiphallus much as drawn for *miwoki* by Gurney and Eades (1961, Figs. 17–19), but posterior margin of bridge much narrower in dorsal view.

Coloration.—Agrees well with *rentzi* as originally described, but pale areas with yellow ochre tinge more than gray; a third dark transverse bar on hind femur (at extreme base) hardly distinct, but two usual bars and that opposite darkened genicular area well developed.

Measurements (in millimeters).—Length of body, 19.0; pronotum, 3.0; hind femur, 9.5; front femur, 3.7. Greatest width of pronotum, 5.3; hind femur, 2.5; front femur, 1.2.

Allotype.—Female, same data as holotype. [U. S. National Museum].

Head with ratio of dorsal interocular distance to width of an eye as 9 : 11; frontal costa scarcely sulcate; fastigium moderately concave, the bordering carinae prominent; width across eyes in frontal view compared to width across genae as 8 : 9. Disk of pronotum scarcely cut by 2 sulci anterior to principal sulcus; minimum width of mesosternal interspace much greater than opposite width of a lateral lobe (as 5 : 3); metasternal pits much more distant than width of a metasternal lobe (surface not smooth for measuring).

Supra-anal plate with longitudinal depression anterior to distinct transverse carina, trace of longitudinal depression in posterior fourth; dorsal prominences well developed for this sex; dorsal valves of ovipositor shallowly concave, lateral margins acute. Sper-

matheca not examined.

Coloration.—Essentially as in holotype, but contrasting colors not conspicuous due to method of preservation.

Measurements (in millimeters).—Length of body, 22.5; pronotum, 4.6; hind femur, 10.5; front femur, 3.4. Greatest width of pronotum, 6.5; hind fermur, 2.6; front femur, 1.0.

Variation.—The 4 male paratypes show no significant structural variation. Three of them have traces of pink on the ventral surface of the thorax and near the end of the abdomen; one of the three also has the dorsum of the abdomen tinged with red. The four are of very uniform size (measurements in millimeters: Body, 18.0; pronotum, 3.0; hind femur, 9.0).

Specimens examined.—9 (5 ♂, 1 ♀, 3 juv. Holotype, allotype, paratypes). The entire series has the same data as the holotype.

Hypsalonia merga is known only from Top Lake, in northeastern El Dorado County, Calif. It is 8 miles west of Fallen Leaf Lake and about 4 miles northwest of Devils Basin, the nearest locality known for *H. rentzi.* The altitude of Top Lake is about 8,200 feet, and an escarpment rises rapidly to the north and east to a ridge of 9,300 feet; an equally rapid drop to the south and west of another thousand feet tends to isolate the lake, which occupies about 3 acres in the fall and probably twice that area in the spring. The terrain is essentially granitic, and the new grasshopper appears to be associated with sedges that grow abundantly around the lake.

The name *merga* is from a Latin word meaning "two-pronged pitchfork," in allusion to the forked apical portion of the ventral aedeagal valves.

References

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